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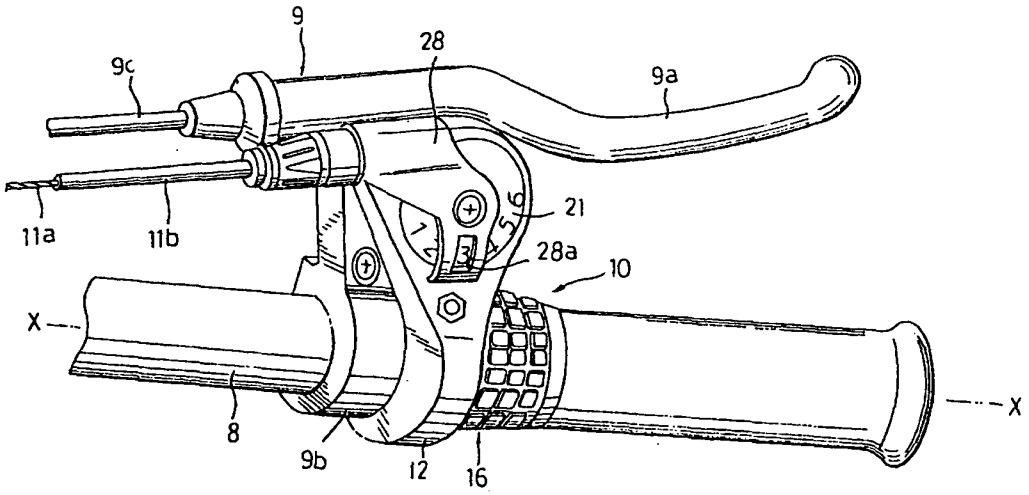
(54) Grip for a bicycle shift control device

(57) A rotatable handgrip (16) for a twist-grip shift control device (10) includes a rotatable member and a flexible grip disposed over the rotatable member. One or more spaces are defined between an inner peripheral surface of the grip and an outer peripheral surface of the rotatable member so that the grip bends radially inwardly in response to pressure from a hand part (palm, finger, thumb, etc.) so as to generally conform to the hand part. The space may be formed by a recess formed on the inner peripheral surface of the grip, on the outer peripheral surface of the rotatable member, a combination of recesses on the grip and the rotatable member, or through some other means.

FIG.1



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Description

BACKGROUND OF THE INVENTION

The present invention is directed to bicycle shift control devices and, more particularly, to a grip for a twist-grip shift control device which conforms more closely to a rider's hand.

Twist-grip shift control devices are sometimes used to control various types of bicycle transmissions. Examples of such devices are disclosed in JP 44-26571; USP 3,633,437; USP 4,900,291 and USP 5,197,927. Such devices typically include a generally annular rotatable member that is mounted around the bicycle handlebar coaxially with the handlebar axis, wherein rotation of the rotatable member with the palm of the hand controls the pulling and releasing of the transmission control cable.

For reliable operation of twist-grip shift control devices, it is desirable to have adequate traction between the palm of the hand and the rotatable member. USP 5,564,316 and USP 5,584,213 discuss the use of nubs and elongated ribs on a flexible cover to increase the traction between the hand and the rotatable member. However, while such nubs and ribs may help improve traction, they also tend to jam into the rider's hand, thus creating pain and fatigue.

SUMMARY OF THE INVENTION

The present invention is directed to a rotatable member for a twist-grip shift control device wherein the grip portion of the rotatable member conforms closely to a rider's hand to increase traction between the palm of the hand and the rotatable member, but which significantly decreases the risk of pain and fatigue. In one embodiment of the present invention, a rotatable handgrip for a twist-grip shift control device includes a rotatable member and a flexible grip disposed over the rotatable member. One or more spaces are defined between an inner peripheral surface of the grip and an outer peripheral surface of the rotatable member so that the grip bends radially inwardly in response to pressure from a hand part (palm, finger, thumb, etc.) so as to generally conform to the hand part. The space may be formed by a recess formed on the inner peripheral surface of the grip, on the outer peripheral surface of the rotatable member, a combination of recesses on the grip and the rotatable member, or through some other means. A rotatable grip constructed according to the present invention increases traction between the palm of the hand and the rotatable grip without requiring ribs or nubs. However, the present invention also may be employed advantageously in a handgrip which uses ribs and nubs, because the space between the grip and the rotatable member allow the ribs and nubs to yield to the pressure of the rider's hand. This, in turn, reduces or eliminates the incidences of pain and fatigue.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an oblique view of a particular embodiment of a bicycle twist-grip shift control device according to the present invention mounted together with a brake lever assembly;

Figures 2A and 2B are front and side views, respectively, of a particular embodiment of a rotatable member according to the present invention used in the twist-grip shift control device of Figure 1;

Figures 3A and 3B are front and side views, respectively, of a particular embodiment of a flexible grip according to the present invention that is used with the rotatable member shown in Figures 2A and 2B;

Figure 4 is a side cross sectional view illustrating the flexible grip shown in Figures 3A and 3B installed on the rotatable member shown in Figures 2A and 2B;

Figure 5 is a side cross sectional view of the rotatable member and flexible grip illustrating how the flexible grip bends in response to a gripping force exerted by a hand;

Figure 6 is a side cross sectional view of an alternative embodiment of a rotatable member and flexible grip according to the present invention;

Figure 7 is a side cross sectional view of another alternative embodiment of a rotatable member and flexible grip according to the present invention; and

Figure 8 is a side cross sectional view of another alternative embodiment of a rotatable member and flexible grip according to the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Figure 1 is an oblique view of a particular embodiment of a twist-grip shift control device 10 according to the present invention mounted together with a brake lever assembly 9. As shown in Figure 1, shift control device 10 includes a housing 12 mounted around a handlebar 8, a rotatable handgrip 16 structured for rotation around an axis X coaxial with handlebar 8, a pulley 21 for pulling and releasing an inner wire 11a of control cable 11, and a pulley retaining member 28 for retaining pulley 21 to housing 12. Pulley retaining member 28 may include a framed opening 28a for selectively displaying a numeral disposed on pulley 21 indicating the currently selected gear. A motion transmitting mechanism (not shown) is disposed between rotatable handgrip 16 and pulley 21 for transmitting rotation of handgrip 16 to pulley 21. The motion transmitting mechanism may be constructed, for example, according to copending U.S. patent application number 08/854,520 filed May 12, 1997 entitled "Bicycle Shift Control Device" by Takuro Yamane and incorporated herein by reference. Since the motion transmitting mechanism does not form a part of the present invention, a detailed description of that mechanism shall be omitted.

Brake lever assembly 9 includes a brake lever 9a

pivotably mounted to a brake lever bracket 9b which, in turn, is mounted around handlebar 8 in close proximity to (e.g., adjacent) housing 12 of shift control device 10. Brake lever 9a is connected to a brake control cable 9c for controlling a brake device in a conventional manner.

As shown in Figures 2A, 2B, 3A, 3B and 4, handgrip 16 includes a rotatable member 50 and a flexible grip 54. As shown in Figures 2A and 2B, rotatable member 50 includes a generally cylindrical main body 56 having an outer peripheral surface 58; a generally frustoconical intermediate portion 62, and a larger generally cylindrical portion 66 which interfaces with the motion transmitting mechanism within housing 12. A plurality of grip engaging members in the form of ribs 70 elongated in the direction of the handlebar axis X extend radially outwardly from outer peripheral surface 58 of main body 56. In this embodiment, ribs 70 are evenly spaced in the circumferential direction of outer peripheral surface 58. Each rib includes a pair of side surfaces 74 that extend from a side surface 82 of frustoconical portion 62 in the direction of the handlebar axis X, and a top surface 86 that inclines slightly radially inwardly from side surface 82 of frustoconical portion 62 to a rib end surface 90 located at an intermediate portion of outer peripheral surface 58. The plurality of ribs 70 define a corresponding plurality of valleys 94 disposed between each pair of adjacent ribs 70, where the bottom floor 92 of each valley 94 is formed by outer peripheral surface 58 of main body 56. In this embodiment, outer peripheral surface 58 has a constant radius of curvature R from handlebar axis X along its entire axial length so that outer peripheral surface 58 has the shape of a straight cylinder. As a result, the floor 92 of each valley 94 likewise has a constant radius of curvature as shown in Figure 2B.

As shown in Figures 3A, 3B, and 4, flexible grip 54 snúgly fits around outer peripheral surface 58 of rotatable member 50, and an outer peripheral surface 96 of grip 54 includes a plurality of gripping projections 98 to further facilitate traction between the rider's hand and grip 54 (and hence) rotatable handgrip 16. The inner peripheral surface 100 of grip 54 includes a plurality of rotatable member engaging recesses 104 that are evenly spaced in the circumferential direction of inner peripheral surface 100. Each rotatable member engaging recess 104 is shaped for snugly fitting to a corresponding rib 70 so that grip 54 is nonrotatably secured to rotatable member 50. A plurality of recesses 108 disposed between spaced apart pairs of inner peripheral surface portions 109 likewise are evenly spaced along the inner peripheral surface of grip 54. Each recesses 108 cooperates with a corresponding valley floor 92 for forming a plurality of spaces 110 as shown in Figure 4. Inner peripheral surface portions 109 are disposed adjacent to their corresponding ribs 70 and contact both the rib 70 and the adjacent valley floor 92 to snugly fit grip 54 to rotatable member 50.

Figure 5 is a side cross sectional view of the rotatable member 50 and flexible grip 54 illustrating how the flexible grip 54 bends in response to a gripping force exerted by a hand. As shown in Figure 5, a finger 120 presses radially inwardly to firmly grasp rotatable grip 16. Because of the flexibility of grip 54, the portions of grip 54 disposed over spaces 110 form dents 124 and 126 which conform to finger 120 in response to the radially inwardly directed pressure of finger 120. When further pressure is applied by finger 120, the portions of grip 54 disposed over spaces 110 bend radially inwardly as shown in Figure 5 for partially or substantially reducing the volume of the corresponding space 110. Because of this yielding nature of grip 54, dents 124 and 126 enhance the traction between the rider's hand and rotatable handgrip 16 by conforming more closely to the rider's hand. Also, there are no sharp edges jamming into the rider's hand as in the prior art rib/nub designs. Furthermore, the yielding nature of grip 54 also cushions the rider's hand to avoid the excessive pressures caused by prior art rib/nub designs, thus further reducing the risk of pain or fatigue.

Figure 6 is a side cross sectional view of an alternative embodiment of a rotatable handgrip 16A according to the present invention using a different rotatable member 50A and flexible grip 54A. In this embodiment, grip 54A includes a plurality of rotatable member engaging members 55A projecting radially inwardly from the inner peripheral surface 100A. Rotatable member 50A includes a plurality of grip engaging recesses 57A formed in outer peripheral surface 58A, wherein each rotatable member engaging member 55A is disposed in a corresponding grip engaging recess 57A. A plurality of recesses 108A disposed between adjacent pairs of rotatable member engaging members 55A are evenly spaced along the inner peripheral surface 100A of grip 54A. Each recess 108A cooperates with a corresponding portion of the outer peripheral surface 58A of rotatable member 50A for forming a plurality of spaces 110A that function in the same manner as spaces 110 in the first embodiment.

Figure 7 is a side cross sectional view of another alternative embodiment of a rotatable handgrip 16B according to the present invention using a different rotatable member 50B and flexible grip 54B. As in the first embodiment, the rotatable member 50B includes a plurality of grip engaging members in the form of ribs 70B projecting radially outwardly from the outer peripheral surface 58B, the grip 54B includes a corresponding plurality of rotatable member engaging recess 104B, and each grip engaging member 70B is disposed in a corresponding rotatable member engaging recess 104B. However, in this embodiment, grip 54B does not have recesses corresponding to recesses 108 in the first embodiment. Instead, a plurality of evenly spaced recesses 150 are formed in the outer peripheral surface 58B of rotatable member 50B. Each recess 150 cooperates with the inner peripheral surface 100B of grip 54B for forming a plurality of spaces 110B that function in the same manner as spaces 110 in the first embodiment.

Figure 8 is a side cross sectional view of another alternative embodiment of a rotatable handgrip 16C according to the present invention using a different rotatable member 50C and flexible grip 54C. In this embodiment, the grip 54C includes a plurality of rotatable member engaging members 55C projecting radially inwardly from the inner peripheral surface 100C, the rotatable member 50C includes a plurality of grip engaging recesses 57C formed in the outer peripheral surface 58C, and each rotatable member engaging member 55C is disposed in a corresponding grip engaging recess 57C. A plurality of evenly spaced recesses 150C are formed in the outer peripheral surface 58C of rotatable member 50C. Each recess 150C cooperates with the inner peripheral surface 100C of grip 54C for forming a plurality of spaces 110C that function in the same manner as spaces 110 in the first embodiment.

While the above is a description of various embodiments of the present invention, further modifications may be employed without departing from the spirit and scope of the present invention. For example, the size, orientation, location and shape of the various components may be changed as desired. Material may be added or removed from the parts as well. Thus, the scope of the invention should not be limited by the specific structures disclosed. Instead, the true scope of the invention should be determined by the following claims. Of course, although labeling symbols are used in the claims in order to facilitate reference to the figures, the present invention is not intended to be limited to the constructions in the appended figures by such labeling.

Claims

1. A rotatable handgrip (16, 16A) for a bicycle shifter comprising:

   a rotatable member (50, 50A), and
   a flexible grip (54, 54A) disposed over the rotatable member (50, 50A),
   characterized in that a space (110, 110A) is defined between an inner peripheral surface of the grip (54, 54A) and an outer peripheral surface of the rotatable member (50, 50A) so that the grip (54, 54A) dents radially inwardly in response to pressure from a hand part so as to generally conform to the hand part; and wherein a recess (108, 108A) is formed on the inner peripheral surface of the grip (54, 54A) for forming the space (110, 110A).

2. A rotatable handgrip (16B, 16C) for a bicycle shifter comprising:

   a rotatable member (50B, 50C), and
   a flexible grip (54B, 54C) disposed over the rotatable member (50B, 50C),
   characterized in that a space (110B, 110C) is defined between an inner peripheral surface of the grip (54, 54A) and an outer peripheral surface of the rotatable member (50, 50A) so that the grip (54, 54A) dents radially inwardly in response to pressure from a hand part so as to generally conform to the hand part; and wherein a recess (150) is formed on the outer peripheral surface of the rotatable member for forming the space (110B, 110C).

3. The handgrip according to claim 1 or 2, **characterized in that** the grip (54, 54A, 54B, 54C) bends radially inwardly into the space (110, 110A, 110B, 110C) in response to pressure from the hand part.

4. The handgrip according to claim 1 or 3, **characterized in that** a plurality of the recesses (108, 108A) are formed on the inner peripheral surface of the grip (54, 54A) for forming a plurality of the spaces.

5. The handgrip according to claim 4, **characterized in that** the plurality of recesses (108, 108A) are disposed evenly along the inner peripheral surface of the grip (54, 54A).

6. The handgrip according to any of claims 1 to 5, **characterized in that** the rotatable member (50) includes a grip engaging member projecting radially outwardly from the outer peripheral surface, wherein the grip includes a rotatable member engaging recess, and wherein the grip engaging member is disposed in the rotatable member engaging recess.

7. The handgrip according to any of claims 1 to 5, **characterized in that** the grip includes a rotatable member engaging member projecting radially inwardly from the inner peripheral surface, wherein the rotatable member includes a grip engaging recess, and wherein the rotatable member engaging member is disposed in the grip engaging recess.

8. The handgrip according to any of claims 1 to 5, **characterized in that** the rotatable member includes a plurality of elongated ribs projecting radially outwardly from the outer peripheral surface, wherein the grip includes a plurality of rotatable member engaging recesses, and wherein the plurality of ribs are disposed in corresponding ones of the plurality of rotatable member engaging recesses.

9. The handgrip according to claim 8, **characterized in that** a plurality of the recesses are formed on the inner peripheral surface of the grip for forming a plurality of the spaces.

10. The handgrip according to claim 9, **characterized in that** the plurality of ribs are disposed evenly in a circumferential direction along the outer peripheral surface of the rotatable member.

11. The handgrip according to claim 10, **characterized in that** the plurality of recesses are disposed evenly in the circumferential direction along the inner peripheral surface of the grip.

12. The handgrip according to claim 11, **characterized in that** a single recess is disposed between each adjacent pair of the plurality of ribs.

13. The handgrip according to claim 1 or 2, **characterized in that** the grip includes a plurality of elongated ribs projecting radially inwardly from the inner peripheral surface, wherein the rotatable member includes a plurality of grip engaging recesses, and wherein the plurality of ribs are disposed in corresponding ones of the plurality of grip engaging recesses.

14. The handgrip according to claim 13, **characterized in that** a plurality of the recesses are formed on the inner peripheral surface of the grip for forming a plurality of the spaces.

15. The handgrip according to claim 14, **characterized in that** the plurality of ribs are disposed evenly in a circumferential direction along the inner peripheral surface of the grip.

16. The handgrip according to claim 15, **characterized in that** the plurality of recesses are disposed evenly in the circumferential direction along the inner peripheral surface of the grip.

17. The handgrip according to claim 2, **characterized in that** a plurality of the recesses are formed on the outer peripheral surface of the rotatable member (50B, 50C) for forming a plurality of the spaces.

18. The handgrip according to claim 17, **characterized in that** the plurality of recesses are disposed evenly along the outer peripheral surface of the rotatable member.

19. The handgrip according to claim 8, **characterized in that** a plurality of the recesses are formed on the outer peripheral surface of the rotatable member for forming a plurality of the spaces.

20. The handgrip according to claim 19, **characterized in that** the plurality of ribs are disposed evenly in a circumferential direction along the outer peripheral surface of the rotatable member.

21. The handgrip according to claim 20, **characterized in that** the plurality of recesses are disposed evenly in a circumferential direction along the outer peripheral surface of the rotatable member.

22. The handgrip according to claim 21, **characterized in that** a single recess is disposed between each adjacent pair of the plurality of ribs.

23. The handgrip according to claim 13, **characterized in that** a plurality of the recesses are formed on the outer peripheral surface of the rotatable member for forming a plurality of the spaces.

24. The handgrip according to claim 23, **characterized in that** the plurality of ribs are disposed evenly in a circumferential direction along the inner peripheral surface of the grip.

25. The handgrip according to claim 24, **characterized in that** the plurality of recesses are disposed evenly in the circumferential direction along the outer peripheral surface of the rotatable member.

26. The handgrip according to claim 15 or 25, **characterized in that** a single recess is disposed between each adjacent pair of the plurality of ribs.

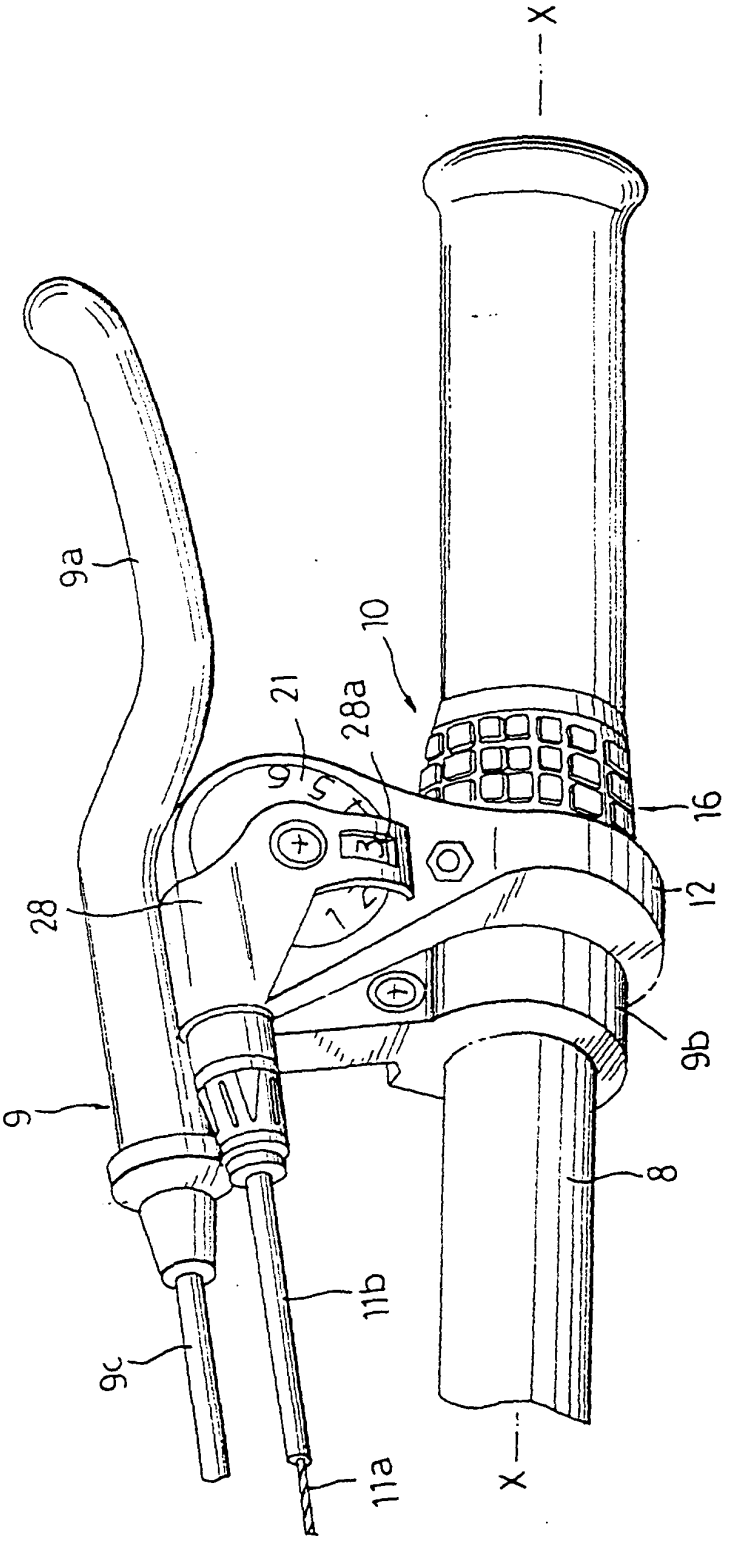


FIG.1

FIG.2A

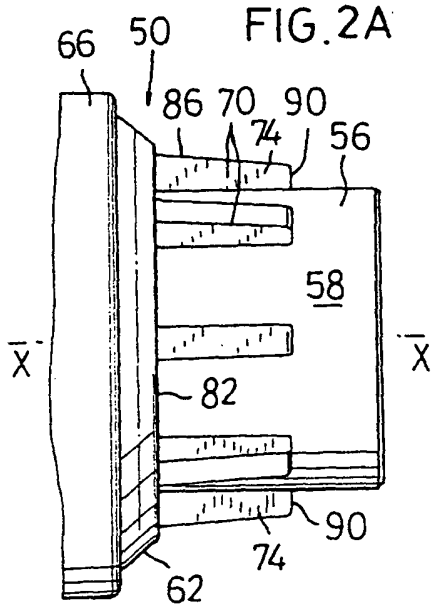


FIG.2B

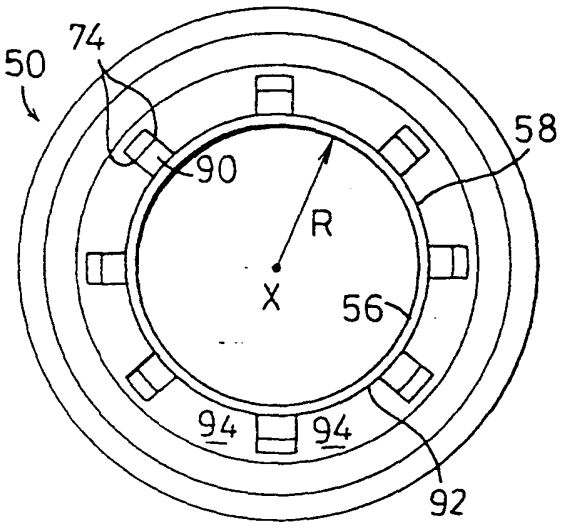


FIG.3A

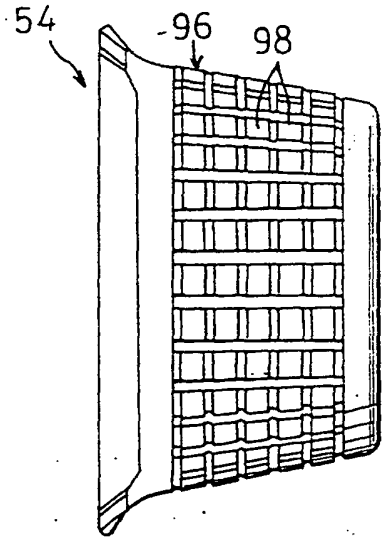


FIG.3B

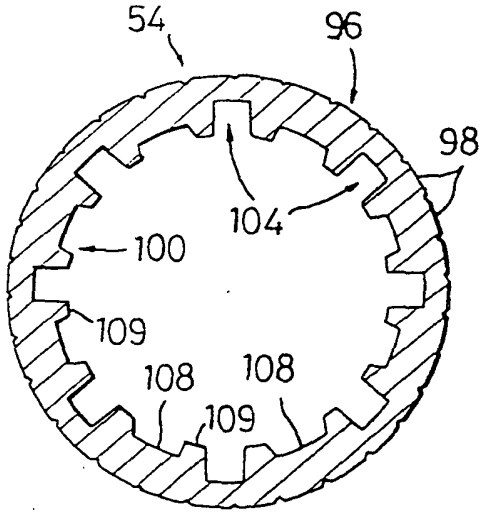
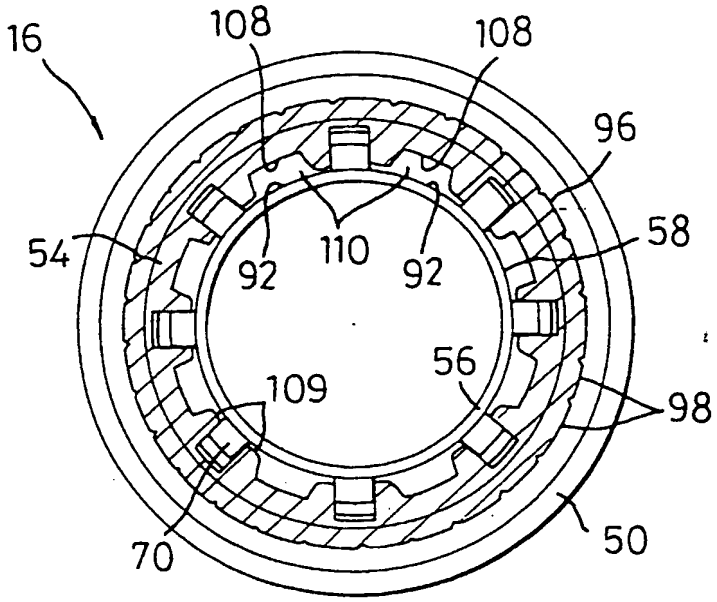


FIG. 4


16
108
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96
54
92
110
92
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56
109
98
70
50

FIG. 5

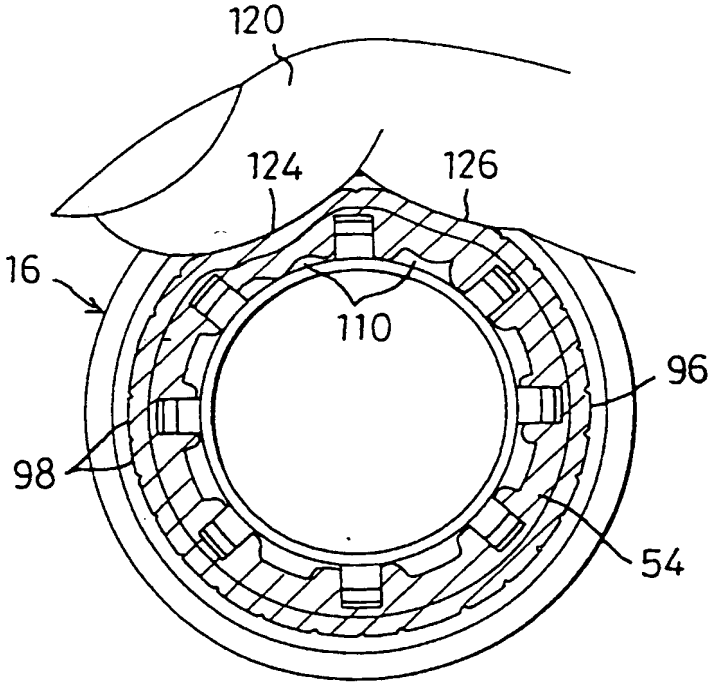
120
124
126
16
110
96
98
54

FIG.6

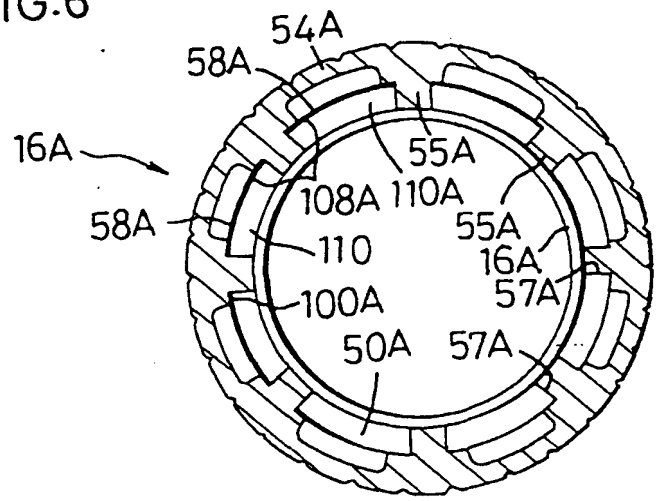

FIG.7

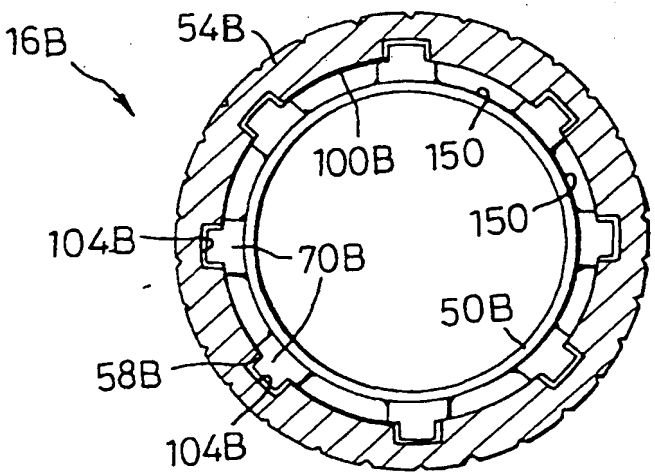

FIG.8